

NEW SPECIES AND NEW RECORDS OF SCALED
POLYCHAETES (POLYCHAETA: POLYNOIDAE)
FROM THE AXIAL SEAMOUNT CALDERA OF THE
JUAN DE FUCA RIDGE IN THE NORTHEAST PACIFIC
AND THE EAST PACIFIC OCEAN OFF
NORTHERN CALIFORNIA

Marian H. Pettibone

Abstract.—A new species of *Harmothoe globosa* from the Axial Seamount Caldera on the Juan de Fuca Ridge is described. Polynoids from the Gorda Ridge off northern California include *Harmothoe gordae*, new species, in Harmothoinae, from Wood Island; *Parabathynoe brisinga*, new genus, new species, in Arctonoinae, commensal with a brisingid asteroid; *Lepidonotopodium piscisae*, new record, in Lepidonotopodinae; *Levensteiniella kincaidi*, new record, and *L. intermedia*, new species, in Macellicephalinae; and *Branchinotogluma grasslei* and *Opisthotrochopodus tunnicliffeae*, new records, in Branchinotogluminae.

A new species of *Harmothoe* (Subfamily Harmothoinae) has been discovered from fresh basalts up to 100 meters from the hydrothermal vents in the Axial Seamount Caldera of the Juan de Fuca Ridge, collected by DSRV *Alvin*. An additional seven species of polynoids were collected on the Gorda Ridge off northern California by DSRV *Alvin* and in the northern Escanaba Trough of the Gorda Ridge by DSRV *Sea Cliff*. The seven species from the Gorda Ridge include a new species of *Harmothoe*; a new genus and new species (Subfamily Arctonoinae) commensal with a brisingid asteroid; new records of *Lepidonotopodium piscisae* (Subfamily Lepidonotopodiinae); a new species of *Levensteiniella* and new records of *L. kincaidi* (Subfamily Macellicephalinae); and new records of *Branchinotogluma grasslei* and *Opisthotrochopodus tunnicliffeae* (Subfamily Branchinotogluminae).

The specimens are deposited in the National Museum of Natural History, Smithsonian Institution (USNM) and the Scripps Institution of Oceanography (SIO).

Subfamily Harmothoinae Willey, 1902
Genus *Harmothoe* Kinberg, 1856
Harmothoe globosa, new species
Figs. 1, 2

Material examined.—Northeast Pacific, Axial Seamount Caldera, Juan de Fuca Ridge, 45°58'N, 130°03'W, 1570 m, DSRV *Alvin* dive 2087, 15 Aug 1988, from fresh basalts, up to 100 m from hydrothermal vents, holotype (USNM 123368).

Description.—Length of holotype 32 mm, width with setae 12 mm, segments 41, last one minute. Body flattened ventrally, arched dorsally, tapering slightly anteriorly and more so posteriorly, with long parapodia nearly as long as body width. Middorsum brownish with 2 light transverse ciliated bands per segment between bases of elytophores and dorsal tubercles (Fig. 1A, C). Elytra 15 pairs, on segments 2, 4, 5, 7, alternate segments to 23, 26, 29, and 32. Elytra round, subreniform to oval, large, overlapping, covering dorsum, rather thick stiff, with most of surface covered with conical

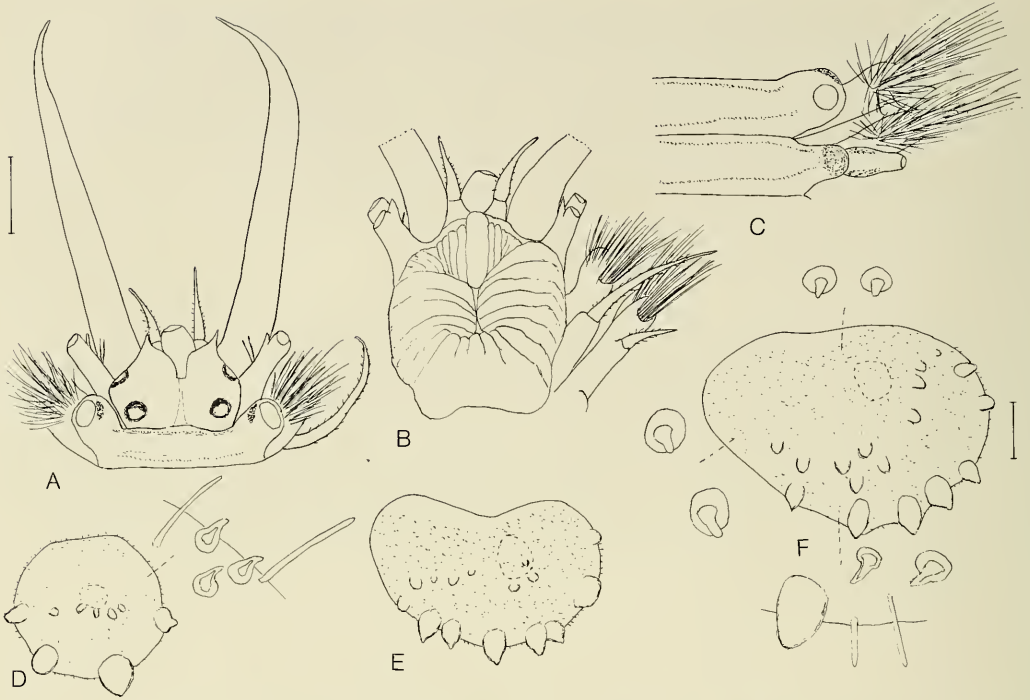


Fig. 1. *Harmothoe globosa*, holotype, USNM 123368: A, Dorsal view of anterior end, styles of median antenna, dorsal and ventral tentacular cirri missing; B, Same, ventral view, right side and palps only partially shown; C, Dorsal view of right half of segments 5 and 6, style of dorsal cirrus on segment 6 missing; D, Right 1st elytron from segment 2, with detail of microtubercles and papillae; E, Right 2nd elytron from segment 4; F, right middle elytron, with detail of macrotubercle, microtubercles and papillae. Scales = 1.0 mm for A–C; 1.0 mm for D–F.

microtubercles, bare region near antero-medial side; additional balloonlike, bulbous macrotubercles with nipple-like tips emerging from wide bases near posterior and lateral borders plus smaller oval macrotubercles on middle part, and some scattered delicate papillae on border and surface (Fig. 1D–F). Elytrophores large, bulbous, reddish glandular area on anterior side (Figs. 1A, C, 2A). Dorsal cirri on segments without elytra; cirrophores long, cylindrical, on posterior sides of notopodia, wider basally and enclosing anterior and posterior reddish glandular areas; styles long, tapering distally, extending beyond setae, with delicate clavate papillae; dorsal tubercles nodular, enclosing reddish glandular areas (Figs. 1C, 2B) smaller from segment 24, indistinct on 9 posterior cirriferous segments.

Prostomium bilobed, wider than long, with distinct cephalic peaks including delicate tips; median antenna with large cylindrical ceratophore in anterior notch, style missing (probably long); ceratophores of lateral antennae small, inserted ventrally and converging midventrally, with short, subulate, papillate styles; eyes large, anterior pair of anterolateral just anterior to widest part of prostomium, posterior pair posterodorsal; palps stout, long, tapered, minutely papillate (Fig. 1A, B). First segment not distinct dorsally; tentaculophores lateral to prostomium, each with small acicular lobe, 2 setae on inner side, and pair of dorsal and ventral tentacular cirri with styles missing (probably long, similar to buccal cirri); distinct ventrally forming anterior and lateral lips of ventral mouth, with facial ridge but

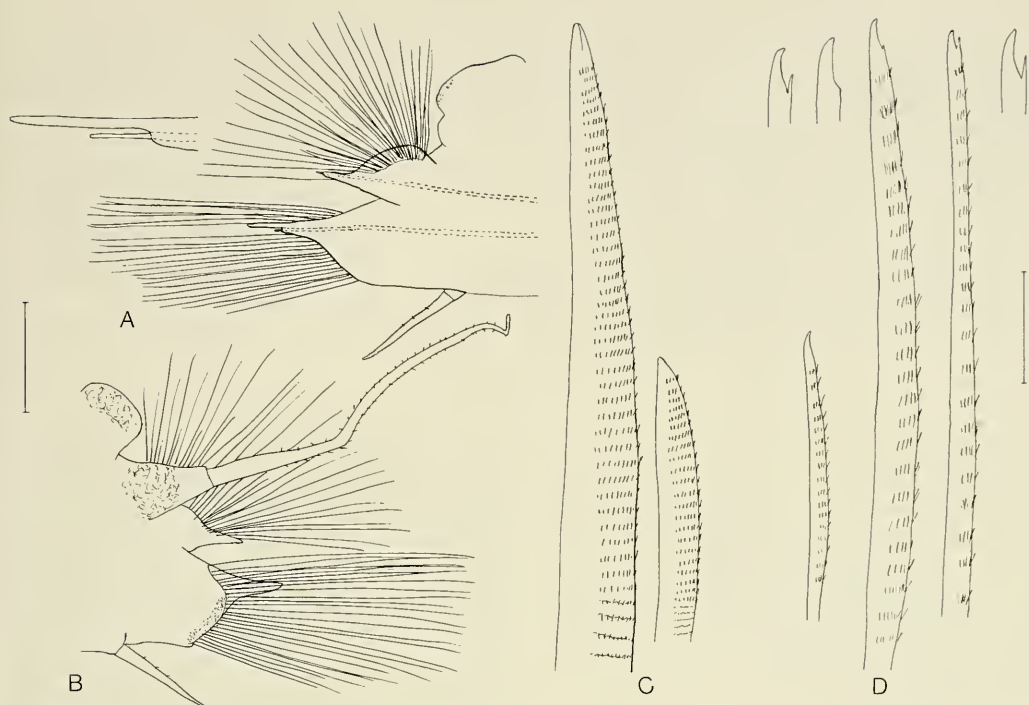


Fig. 2. *Harmothoe globosa*, holotype USNM 123368: A, Right elytrigerous parapodium, anterior view, acicula dotted, with detail of neuropodial supraacicular process; B, Right cirriferous parapodium, posterior view; C, Long and short notosetae; D, Lower and upper subacicular and supraacicular neurosetae, with detail of tips. Scales = 1.0 mm for A, B; 0.1 mm for C, D.

without distinct facial tubercle (Fig. 1A, B). Second or buccal segment with small nuchal lobe, first pair of large elytriphores, well-developed, biramous parapodia, and long, papillate buccal cirri, and forming posterior lip of ventral mouth (Fig. 1A, B). Pharynx not extended and not examined; dark color of pharynx visible through delicate integument.

Biramous parapodia with both rami well developed, with acicular processes sharply pointed and tips of acicula projecting; notopodium shorter than neuropodium, rounded, with acicular process on lower side; neuropodium with conical presetal acicular lobe, long digitiform supraacicular process and shorter rounded postsetal lobe with reddish glandular area on distal part (Fig. 2A, B). Notoetae very numerous, forming radiating bundle, stouter than neurosetae, of

3 lengths, shorter, curved and longer nearly straight, with numerous rows and tapered blunt bare tips, some of longest ones showing faint longitudinal groove (Fig. 2C). Neurosetae very numerous, forming fan-shaped bundle, with numerous spinous rows; supraacicular neurosetae more slender than subacicular ones; mostly showing delicate secondary tooth or indication of one; lower ones with entire tips (Fig. 2D). Ventral cirri short, tapering, with small clavate papillae (Fig. 2A, B).

Pygidium small, with dorsal anus medial to last pair of parapodia, with pair of anal cirri (styles missing). Nephridial papillae beginning on segment 6, small, oval, on lateral side of rounded, inflated area.

Etymology.—Named *globosa*, referring to the globular macrotubercles on the elytra.

Remarks.—The unusual balloonlike mac-

Table 1.—Comparison of *Harmothoe globosa*, new species and *H. macnabi* Pettibone.

	<i>Harmothoe globosa</i>	<i>Harmothoe macnabi</i>
Elytral macrotubercles	balloonlike, near border and on surface (Fig. 1D–F)	extensions on posterior border (Pettibone 1985c, Fig. 6C)
Prostomium	large cephalic peaks; 2 pairs of large eyes (Fig. 1A)	small cephalic peaks; without eyes (Pettibone 1985c, Fig. 6A)
Tentaculophore	with 2 setae (Fig. 1A)	with 6–8 setae (Pettibone 1985c, Fig. 6A, B)
Neuropodial presetal acicular lobe	with well-developed supraacicular process (Fig. 2A)	without supraacicular process (Pettibone 1985c, Fig. 7B)

rotubercles found on the elytra of *Harmothoe globosa* suggest a greater development of the macrotubercles than those found on *H. macnabi* Pettibone (1985c:749, figs. 6, 7), described from the Galapagos Rift in the East Central Pacific. The two species differ as shown in Table 1.

Harmothoe gordae, new species
Fig. 3

Material.—East Pacific Ocean off northern California, Gorda Ridge, *Alvin* dive 2034, 4 Jun 1988, 41°00'N, 127°29'W, 3362 m, Wood Island, holotype (USNM 123367).

Description.—Length of holotype (male with sperm) 17 mm, width with setae 9 mm, segments 36, last one minute. Body flattened dorsoventrally, tapering slightly anteriorly and posteriorly, with long parapodia nearly as long as body width, without color. Elytrophores 15 pairs, on segments 2, 4, 5, 7, alternate segments to 23, 26, 29, and 32, large, bulbous (Fig. 3A, C). Elytra (all missing except left 14th on segment 29) large, oval, soft, opaque, nearly covered with conical microtubercles, low, oval on anterior part, bare region near anteromedial side; scattered cylindrical papillae on surface and posterior and lateral borders (Fig. 3B). Dorsal cirri on segments without elytra, with long cylindrical cirrophores on posterior sides of notopodia, wider basally; styles long, extending beyond setae, with slender tips

and scattered short papillae; dorsal tubercles prominent, nodular (Fig. 3D).

Prostomium bilobed, with prominent cephalic peaks, without eyes; median antenna with large bulbous ceratophore in anterior notch, with style about twice as long as prostomium, with scattered short papillae; ceratophores of lateral antennae rather large, inserted ventrally, not meeting midventrally, with short, subulate papillate styles; palps stout, tapered, longer than median antenna (Fig. 3A). First segment not distinct dorsally; tentaculophores lateral to prostomium, each with small acicular lobe, 3 setae on inner side and pair of dorsal and ventral tentacular cirri similar to median antenna; ventral surface with facial ridge but without distinct facial tubercle (Fig. 3A). Second or buccal segment with first pair of large elytrophores, well-developed biramous parapodia, and long papillate ventral buccal cirri (Fig. 3A). Pharynx not extended and not examined.

Biramous parapodia with both rami well developed, with projecting acicular lobes and tips of acicula projecting; notopodium shorter than neuropodium, rounded, with projecting acicular process on lower side; neuropodium with conical presetal acicular lobe, with slight indication of rounded supraacicular process; postsetal lobe shorter, rounded (Fig. 3C, D). Notosetae numerous, forming radiating bundle, stouter than neurosetae, short and slightly curved to long

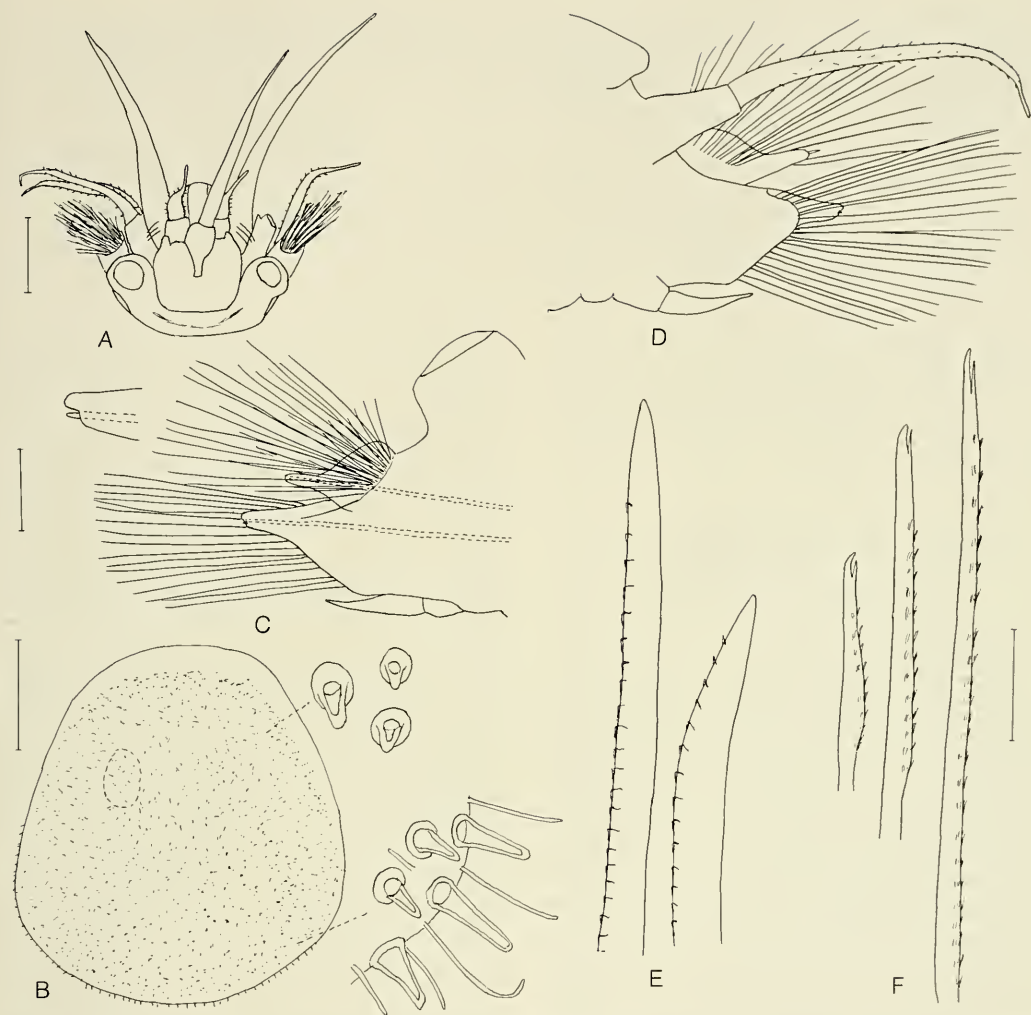


Fig. 3. *Harmothoe gordae*, holotype, USNM 123367: A, Dorsal view of anterior end, right dorsal and ventral tentacular cirri missing; B, Left 14th elytron from segment 29, with detail of microtubercles and papillae; C, Right elytrigerous parapodium, anterior view, acicula dotted; D, Right cirriferous parapodium, posterior view; E, Long and short notosetae; F, Lower, middle and upper neurosetae. Scales = 1.0 mm for A; 1.0 mm for B; 0.5 mm for C, D; 0.1 mm for E, F.

and straight, with spinous rows and rather long, bare, tapering tips (Fig. 3E). Neurosetae numerous, forming fan-shaped bundle; upper ones more slender, with longer spinous regions, lower ones stouter, with shorter spinous regions; all with bifid tips, with long slender secondary tooth (Fig. 3F). Ventral cirri short, tapering (Fig. 3C, D).

Pygidium small, rectangular, with dorsal

anus medial to last pair of small parapodia; anal cirri missing. Nephridial papillae beginning on segment 6, small, on lateral side, projecting dorsally between parapodia.

Etymology.—Named for the collecting site, the Gorda Ridge.

Remarks.—*Harmothoe gordae*, collected on Wood Island on the Gorda Ridge, is close to *H. vagabunda* Pettibone (1985a:146, fig.

Table 2.—Comparison of *Harmothoe gordae*, new species and *H. vagabunda* Pettibone.

	<i>Harmothoe gordae</i>	<i>Harmothoe vagabunda</i>
Prostomium	prominent distinct cephalic peaks (Fig. 3A)	very small cephalic peaks (Pettibone 1985a, Fig. 6A)
Neuropodial presetal acicular lobe	with small rounded supraacicular process (Fig. 3C)	without supraacicular process (Pettibone 1985a, Fig. 6B)
Neurosetae	with long slender secondary tooth (Fig. 3F)	with shorter secondary tooth (Pettibone 1985a, Fig. 6E)

6), described from the North Atlantic in the Tongue of the Ocean, Bahamas, and off St. Croix, Virgin Islands, associated with wood panels. The two species differ as indicated in Table 2.

Subfamily Arctonoinae Hanley, 1989
Parabathynoe, new genus

Type species.—*Parabathynoe brisinga*, new species.

Diagnosis.—Body short, up to 46 segments. Elytra and prominent elytophores 18 pairs, on segments 2, 4, 5, 7, alternate segments to 23, 26, 29, 32, 35, 40, and 43. Elytra thickly covered with conical microtubercles and papillae. Dorsal cirri on segments lacking elytra, with cirrophores and distal styles; dorsal tubercles in line with elytophores. Prostomium bilobed, rounded, with 2 pairs of large eyes, 2 long palps, and 3 antennae: median antenna with ceratophore and long style inserted in anterior notch; lateral antennae inserted subterminally, ventral to median antenna, with ceratophores and short styles only slightly set off from prostomium. First or tentacular segment not visible dorsally; tentaculophores lateral to prostomium, achaetous, with 2 pairs of tentacular cirri; ventral surface with bulbous upper lip. Second or buccal segment with bulbous elytophores of first pair of elytra, small subbiramous parapodia, ventral buccal cirri, and bulbous lateral and wrinkled lower lips. Parapodia subbiramous; notopodia with small conical acicular lobe and bundle of short acicular notosetae; neuropodia larger, with rounded

presetal acicular lobe; postsetal lobe hook-shaped, of two parts: upper part short, rounded; lower part curved dorsally, with thick bushy bundle of long papillae on outer curved border; neurosetae numerous, long, nearly smooth, with tapered, mostly bifid tips; ventral surface of neuropodia thickly papillate. Ventral cirri lacking, except on segment 2. Extended pharynx with 9 pairs of papillae and 2 pairs of chitinous jaws. Commensal with brisingid asteroids.

Etymology.—From the Greek *para*, plus the genus *Bathynoe* Ditlevsen, in the subfamily Arctonoinae; gender feminine.

Remarks.—In comparison with the genera included in the subfamily Arctonoinae by Hanley (1989), *Parabathynoe* is closest to *Bathynoe* Ditlevsen, 1917. Both are relatively short-bodied (less than 50 segments), ventral cirri are present only on segment 2, and lower parts of neuropodial postsetal lobes are curved dorsally and papillated on the curved border. Both are commensal with asteroids.

Bathynoe differs from *Parabathynoe* in a number of features. In the former, the body has prominent middorsal tubercles, lacking in the latter; elytra have a different arrangement and have nodular tubercles and globular micropapillae on the surface, instead of microtubercles and cylindrical papillae; prostomium has short, stumpy palps and has no eyes, instead of long palps and two pairs of eyes; notosetae are absent on subbiramous parapodia, instead of present; and neurosetae are few, short, stout, and strongly hooked, instead of numerous, long, and slender, with minute bifid tips.

Parabathynoe brisinga, new species

Figs. 4, 5

Material.—East Pacific Ocean off northern California, Gorda Ridge, *Alvin* dive 2033, 41°00'N, 127°29'W, 3 Jun 1988, 3356 m, commensal with brisingid asteroid, holotype (USNM 123371), paratype (USNM 123372).

Description.—Length of holotype (female with large yolk eggs in body cavity) 18 mm, width 6 mm with setae, segments 47, last one minute. Paratype incomplete posteriorly, with 32 segments, 11 mm long and 4.5 mm wide. Body flattened ventrally, slightly arched dorsally, tapering slightly anteriorly, and more so posteriorly. Ventral side of body with 2 pairs of large, rounded papillae per segment and numerous small papillae on ventral side of parapodia (Fig. 4E). Elytra 18 pairs, large, covering dorsum, on segments 2, 4, 5, 7, alternate segments to 23, 26, 29, 32, 35, 40, 43. Elytra oval to subniform, thickly covered with conical microtubercles and papillae; thicker, slightly raised area across posterior fifth or sixth of surface (Fig. 5 E–G); elytraphores large and prominent (Figs. 4A, C, 5A). Dorsal cirri on segments lacking elytra, with short cylindrical cirrophores and styles extending beyond neuropodia, styles with proximal $\frac{2}{3}$ cylindrical and slightly bulbous, distal $\frac{1}{3}$ filamentous, with long papillae on lower side of cylindrical part; dorsal tubercles nodular, in line with elytraphores (Figs. 4A, B, D, 5B).

Prostomium oval, bilobed, wider than long, with 2 pairs of eyes on lateral sides, anterior pair very large, twice as large as posterior pair; median antenna with bulbous ceratophore in anterior notch, style about twice as long as prostomium, with filamentous tip; lateral antennae with ceratophores indistinctly set off from prostomium and inserted ventral to median antenna; short styles with clavate enlargements and filamentous tips; palps stout, cylindrical, with filamentous tips; tentaculophores

lateral to prostomium, with small acicular lobe on inner side, achaetous; dorsal and ventral tentacular cirri bulbous subdistally with filamentous tips; facial ridge on bulbous anterior lip of ventral mouth (Fig. 4A, B).

Second or buccal segment without nuchal lobe, with first pair of large elytraphores, subbiramous parapodia much smaller than following parapodia, ventral buccal cirri, similar to tentacular cirri, and bulbous lateral and posterior lips enclosing ventral mouth (Fig. 4A–C).

Parapodia from segment 3 on larger, subbiramous, with small conical notopodial acicular lobe on anterodorsal side of larger neuropodium with longer, rounded presetal acicular lobe with low rounded upper part; shorter, hook-shaped postsetal lobe consisting of short rounded upper half and longer lower half curving dorsally, with bushy bundle of long papillae on outer curved border of lower part (Figs. 4B, 5A, B). Without ventral cirri. Notosetae extending to tip of neuropodium, in small bundle, short, acicular, slightly stouter than neurosetae, nearly smooth, with faint close-set spinous rows and entire tips (Fig. 5C). Neurosetae very numerous, forming fan-shaped bundle, long, enlarged subdistally, tapering to slightly hooked tips, mostly with very small secondary tooth, others entire; upper few (5 or so) with split tips (Fig. 5D). Pharynx (cut open) with 9 pairs of marginal papillae and 2 pairs of amber-colored jaws. Pygidium short, rectangular, between posterior, minute parapodia, with anal cirri (missing).

Etymology.—The species is named for its commensal relationship with brisingid asteroids.

Subfamily Lepidonotopodiinae

Pettibone, 1983

Genus *Lepidonotopodium* Pettibone, 1983*Lepidonotopodium piscisae* Pettibone, 1988

Lepidonotopodium piscisae Pettibone 1988: 193, figs. 1–4.

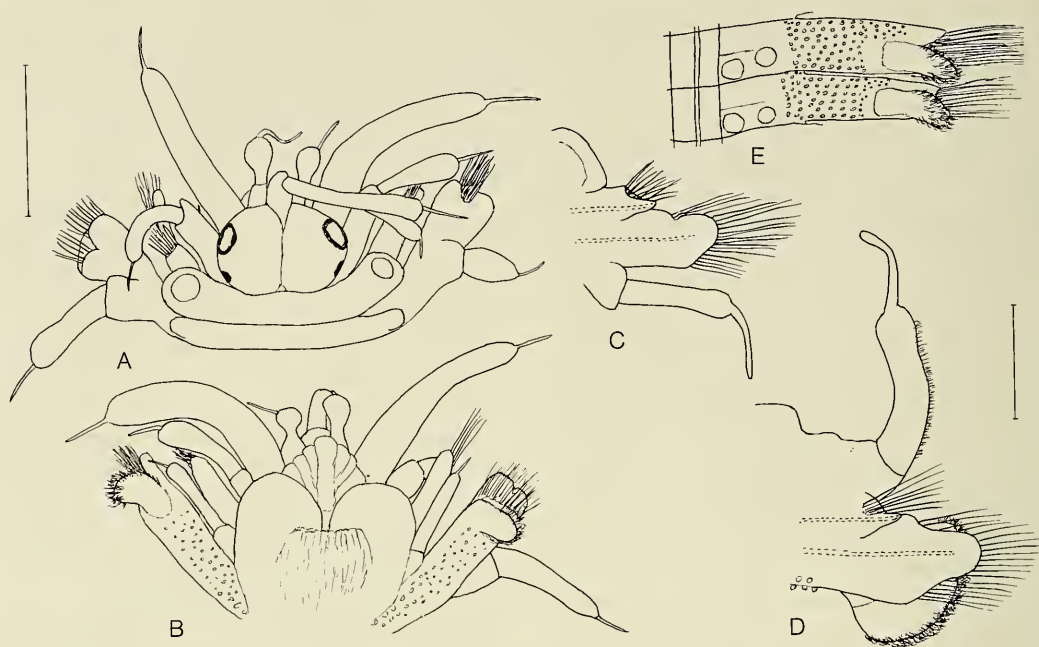


Fig. 4. *Parabathynoe brisinga*, A–D, holotype USNM 123371: A, Dorsal view of anterior end, left ventral tentacular cirrus missing; B, Same, ventral view; C, Left elytrigerous parapodium from segment 2, anterior view, acicula dotted; D, Left cirriferous parapodium from segment 3, anterior view, acicula dotted; E, Ventral view of left side of two middle segments lateral to midventral neural groove. Scales = 1.0 mm for A, B, E; 0.5 mm for C, D.

Lepidonotopodium pettibonae Detinova, 1988:858, fig. 1a–h.

Material.—East Pacific Ocean off northern California, Gorda Ridge, in northern Escanaba Trough, *Sea Cliff* dive 764, 3 Sep 1988, 41°00'N, 127°30'W, 3500 m, 11 specimens (USNM 123369, SIO).

Remarks.—The specimens from the Gorda Ridge agree with the specimens from the hydrothermal vents of the Northeast Pacific Explorer and Juan de Fuca Ridges, described earlier as *Lepidonotopodium pisciscae* by Pettibone (1988, 29 April) and as *L. pettibonae* by Detinova (1988, June). Unfortunately, the former name has priority.

The eleven specimens from the Gorda Ridge were collected in the northern Escanaba Trough in a heavily sedimented area with a large clump of vestimentiferans, including *Rigia* spp., and long filamentous bacteria. The elytra and setae of the poly-

noids were covered with foreign material, including sediment and bacteria. The larger specimens measured 20–22 mm in length, 10–11 mm in width, with 25–26 segments.

Distribution.—Hydrothermal vents of Northeast Pacific Explorer and Juan de Fuca Ridges, in 1500–2208 m and northern Escanaba Trough of Gorda Ridge, in 3500 m.

Subfamily Macellicephalinae
Hartmann-Schröder, 1971;
emended Pettibone, 1976

Genus *Levensteiniella* Pettibone, 1985

The genus includes *L. kincaidi*, described from the Galapagos Rift and the East Pacific Rise at 21°N by Pettibone (1985c), with additional records from the Northeast Pacific Explorer and Juan de Fuca Ridges by Pettibone (1988), and *L. raisae*, described from the Western Pacific in the Mariana Back-

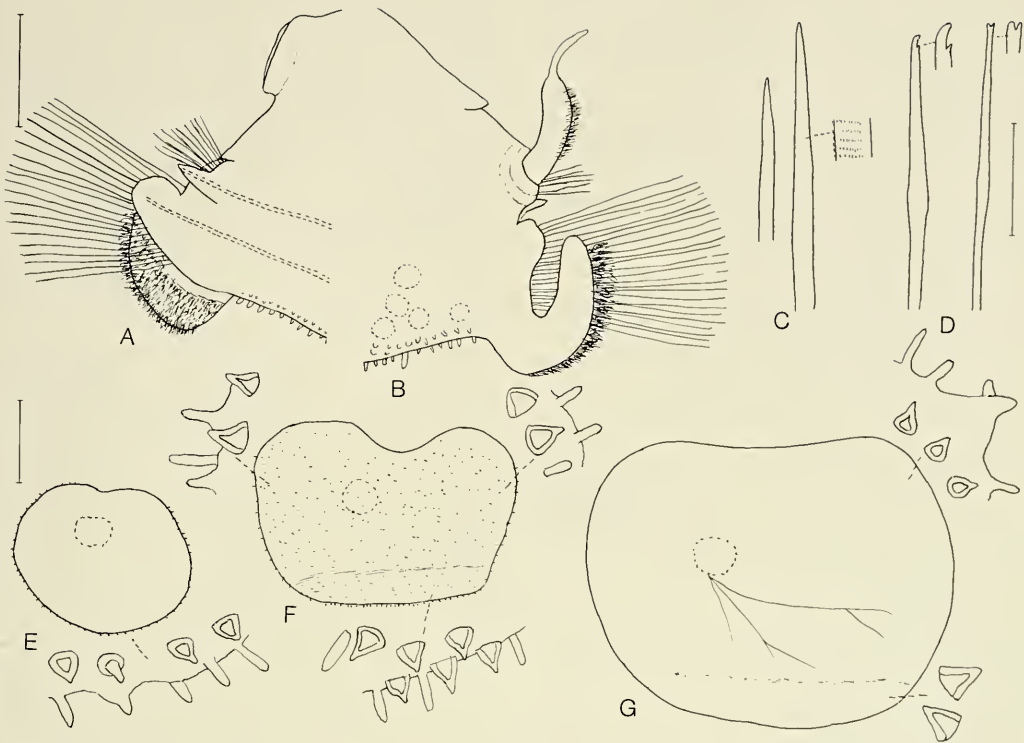


Fig. 5. *Parabathynoe brisinga*, holotype, USNM 123371: A, Right elytrigerous parapodium from segment 15, anterior view, acicula dotted; B, Right cirriferous parapodium from segment 16, posterior view (few eggs in body cavity dotted); C, Notosetae, with detail of faint spinous rows; D, Middle and upper neurosetae, with detail of tips; E, Left 1st elytron from segment 2, with detail of microtubercles and papillae; F, Left 2nd elytron from segment 4, with detail of microtubercles and papillae; G, Left middle elytron, with detail of microtubercles and papillae. Scales = 0.5 mm for A, B; 0.1 mm for C, D.

Arc Basin by Pettibone (1989b). From the Gorda Ridge, additional records of *L. kincaidi* showing some varietal differences are added and a new species is described below.

Levensteiniella kincaidi Pettibone, 1985
Fig. 6

Levensteiniella kincaidi Pettibone, 1985c:
741, figs. 1–3; 1988:199, fig. 5; 1989b:
159.

Material.—East Pacific Ocean off north-
ern California, Gorda Ridge, *Alvin* dive
2036, 6 Jun 1988, 41°00'N, 127°29'W, 3240
m, 1 specimen (USNM 123366). Gorda
Ridge in northern Escanaba Trough, *Sea
Cliff* dive 764, 3 Sep 1988, 41°00'N,

127°30'W, 3500 m, 5 specimens (USNM
123365; SIO).

**Description of specimen from Alvin dive
2036.**—Length 19 mm, width with setae 10
mm, with 26 segments and 11 pairs of ely-
tra. Some elytra with papillae on posterior
and lateral borders enlarged basally; papil-
lae on border and surface variable in shape
(Fig. 6G–I). Prostomium, tentacular and first
buccal segments as described earlier (Fig.
6A). Dorsal cirri and dorsal tubercles, bi-
ramous parapodia, notosetae and neurose-
tae, and ventral cirri, as described earlier
(Fig. 6C–F). Body without 2 pairs of long
ventral papillae on segments 11 and 12 but
with small rounded paired papillae near
basal sides of parapodia on segments 11–19

(Fig. 6B); as reported earlier, long ventral papillae found on only some adults (Pettibone, 1985c, fig. 1D; 1988).

Remarks.—The setae of the specimens from the Escanaba Trough, collected on heavily sedimented fresh basalts, were covered with numerous round and long filamentous bacteria; one was covered with stalked peritrich protozoa.

The elytra of the stem form of *L. kincaidi*, described from the Galapagos Rift and 21°N, have only cylindrical micropapillae near the border and on the surface (Pettibone, 1985c, fig. 1E). The elytra of the varietal form, described on a small specimen from the Juan de Fuca Ridge (Pettibone, 1988, fig. 5A, B) and described here from the Gorda Ridge (Fig. 6G–I) have some additional border papillae enlarged basally.

Distribution.—Hydrothermal vents of tropical East Pacific, Galapagos Rift and East Pacific Rise at 21°N, in 2450–2633 m; Northeast Pacific Explorer Ridge, Endeavour Segment and Axial Seamount, Juan de Fuca Ridge, in 1546–2213 m; and off northern California Gorda Ridge, in 3240–3500 m.

Levensteiniella intermedia,
new species
Figs 7, 8

Material.—East Pacific Ocean off northern California, Gorda Ridge, *Alvin* dive 2042, 12 Jun 1988, 41°00'N, 127°29'W, 3271 m, “clam washings,” holotype (USNM 123370).

Description.—Body flattened ventrally, arched dorsally, slightly tapered anteriorly and more so posteriorly, with parapodia about as long as body width. Eleven pairs of elytra, oval to subreniform, thick, stiff, opaque, with thick oval raised areas or projections on posterior border and some scattered oval micropapillae on surface (Fig. 7D–G).

Prostomium wider than long, deeply bilobed with subtriangular lobes projecting anteriorly, with terminal filaments; without

eyes; ceratophore of median antenna large, bulbous, in anterior notch; style missing; palps long, stout, tapered; tentaculophores lateral to prostomium, achaetous, with small acicular lobe on inner side; dorsal and ventral tentacular cirri about same length as palps (Fig. 7A, B) Segment 2 with first pair of large elytraphores, biramous parapodia, and ventral buccal cirri attached basally lateral to ventral mouth, longer than following ventral cirri (Fig. 7A, B).

Biramous parapodia with notopodium shorter than neuropodium, notopodium rounded with projecting acicular lobe on lower side; neuropodium with conical projecting presetal acicular lobe; postsetal lobe shorter, rounded, deeply cut on dorsal side (Fig. 8A, B). Notoetae very numerous, forming radiating bundle, much stouter than neuroetae, of several lengths, stout, tapering to bare, blunt tips, with smooth or with widely spaced spines along one side (Fig. 8C). Neuroetae very numerous, forming fan-shaped bundle; supraacicular neuroetae with longer spinous regions, with 2 rows of widely spaced spines along borders, with shorter close-set spines on tapered tips (Fig. 8E); subacicular neuroetae with slightly hooked bare tips and close-set minute spines along one border (Fig. 8D). Dorsal cirri with cylindrical cirrophores on anterior side of notopodia; styles with long filamentous tips, extending to about tips of neuroetae; dorsal tubercles nodular to truncate; ventral cirri short, tapering, and extending to distal end of ventral side of neuropodia (Fig. 8B).

Single pair of long ventral papillae on segment 11, much wider basally and extending almost to tip of neuropodium and ending in distal knob and subdistal filament (Fig. 7C). Pygidium small rounded lobe between bases of posterior small parapodia; anal cirri missing.

Etymology.—The species is named based on its intermediate position between the other two species of *Levensteiniella*.

Comparisons.—Important characters separating *L. intermedia* and the other two



Fig. 6. *Levensteiniella kincaidi*, variety, USNM 123366: A, Dorsal view of anterior end; B, Ventral view of left side of segments 10–12, showing rounded papillae on segments 11 and 12; C, Right elytrigerous parapodium, anterior view, acicula dotted; D, Right cirriferous parapodium, posterior view; E, Short and long notosetae; F, Tip of supraacicular and subacicular neurosetae; G, Right 2nd elytron from segment 4, with detail of papillae; H, Right 5th elytron from Segment 9, with detail of surface and border papillae; I, Right 10th elytron from segment 19, with detail of papillae. Scales = 1.0 mm for A, B; 1.0 mm for C, D; 0.1 mm for E, F; 2.0 mm for G–I.

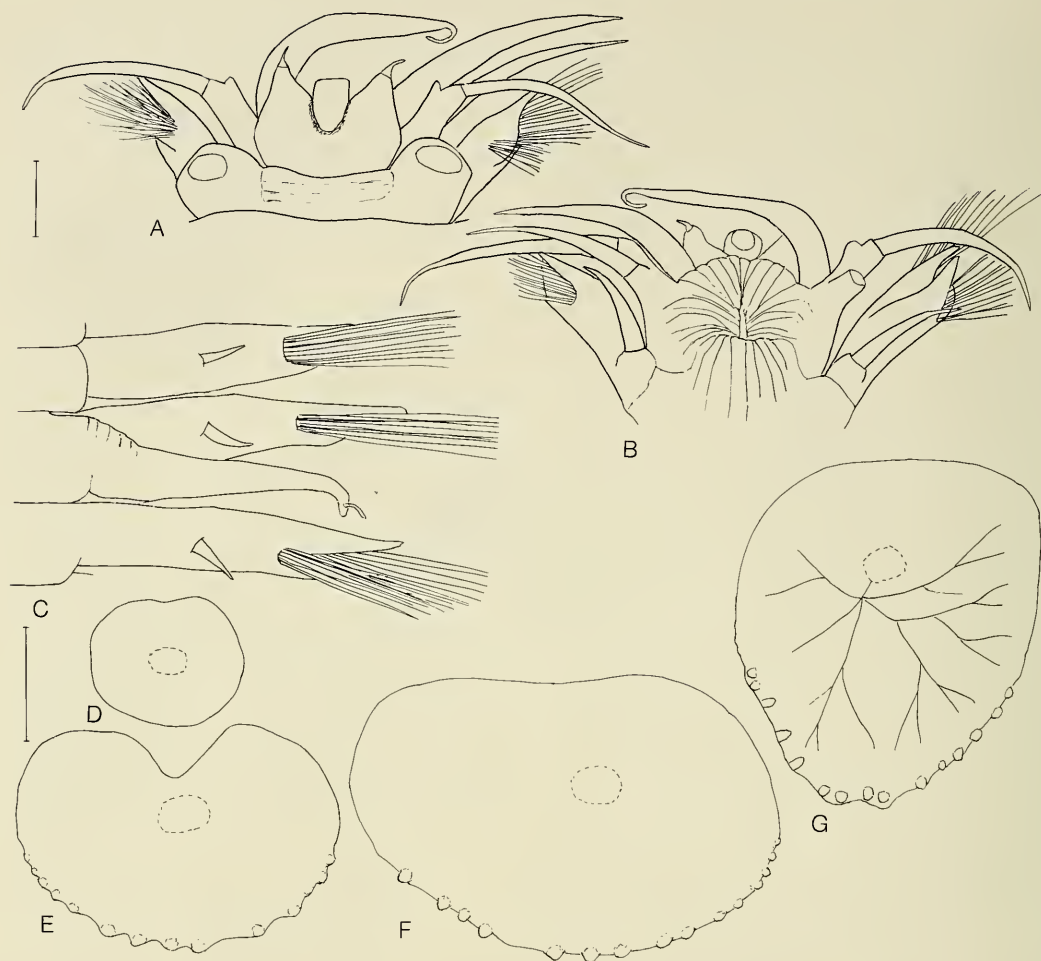


Fig. 7. *Levensteiniella intermedia*, holotype, USNM 123370: A, Dorsal view of anterior end, styles of median antenna and left ventral tentacular cirrus missing; B, Ventral view of same; C, Ventral view of left side of segments 10–12, showing long ventral papilla on segment 11; D, Right 1st elytron from segment 2; E, Right 2nd elytron from segment 4; F, Right middle elytron; G, Left posterior elytron. Scales = 1.0 mm for A–C; 2.0 mm for D–G.

species of *Levensteiniella* are indicated in Table 3.

Subfamily Branchinotogluminae
Pettibone, 1985

Genus *Branchinotogluma* Pettibone, 1985
Branchinotogluma grasslei
Pettibone, 1985

Branchinotogluma grasslei Pettibone, 1985b:457, figs. 5, 6; 1988:199; 1989b:157.

Material.—East Pacific Ocean off northern California, Gorda Ridge, *Alvin* dive

2036, 6 Jun 1988, 41°00'N, 127°29'W, 3240 m, 9 specimens (USNM 123363); *Alvin* dive 2037, 7 Jun 1988, 3261 m, washings from vestimentiferans and alvinellids, 2 specimens (USNM 123362). Gorda Ridge, in northern Escanaba Trough, *Sea Cliff* dive 764, 3 Sep 1988, 41°00'N, 127°30'W, 3500 m, heavily sedimented area with vestimentiferans and long filamentous bacteria, 4 specimens (USNM 123364; SIO).

Remarks.—The 15 specimens from the Gorda Ridge, in 3240–3500 m, agree with the specimens previously described from the



Fig. 8. *Levensteiniella intermedia*, holotype, USNM 123370: A, Right elytrigerous parapodium, anterior view, acicula dotted; B, Right cirriferous parapodium, posterior view; C, Long and short notosetae; D, Lower and upper supraacicular neurosetae; E, Supraacicular neuroseta. Scales = 1.0 mm for A, B; 0.1 mm for C–E.

Table 3.—Comparison of three species of *Levensteiniella*.

	<i>L. kincaidi</i> Pettibone, 1985c	<i>L. raisae</i> Pettibone, 1989	<i>L. intermedia</i> n. sp.
Elytra	with filiform micropapillae on border & surface; some with enlarged bases on posterior border (Fig. 6G–I)	with macro- and microtubercle-papillae on surface and posterior border (Pettibone 1989a, Fig. 1G)	with thickened bulbous projections on posterior border and oval micropapillae on surface (Fig. 7D–F)
Notosetae	with spinous rows (Fig. 6E)	with widely spaced spines along one side (Pettibone 1989a, Fig. 2E)	smooth or with widely spaced spines along one side (Fig. 8C)
Long paired ventral papillae	2 pairs on segments 11 & 12 (Pettibone 1985c, Fig. 1D)	2 pairs on segments 11 & 12 (Pettibone 1989a, Fig. 1E)	single large pair on segment 11 (Fig. 7C)

Galapagos Rift and 21°N vent sites (Pettibone 1985b) and reported from the Explorer and Juan de Fuca Ridges (Pettibone 1988) and the Guaymas Basin (Pettibone, 1989b), in 1495–2633 m, associated with vestimentiferans. The specimens measured 9–22 mm in length, 5–11 mm in width, with 21 segments.

Genus *Opisthotrochopodus*

Pettibone, 1985b

Opisthotrochopodus tunnicliffeae

Pettibone, 1988

Opisthotrochopodus tunnicliffeae Pettibone, 1988:203, figs. 6–9

Material.—East Pacific Ocean off northern California, Gorda Ridge, *Alvin* dive 2036, 6 Jun 1988, 41°00'N, 127°29'W, 3240 m, 5 specimens (USNM 123375); *Alvin* dive 2037, 7 Jun 1988, 3261 m, washings from vestimentiferans and alvinellids, 1 specimen (USNM 123376). Gorda Ridge, in northern Escanaba Trough, *Sea Cliff* dive 764, 3 Sep 1988, 41°00'N, 127°30'W, 3500 m, heavily sedimented area with vestimentiferans and long filamentous bacteria, 7 specimens (USNM 123374; SIO).

Remarks.—The 13 specimens from the Gorda Ridge, in 3240–3500 m, agree with the specimens previously described from the Explorer and Juan de Fuca Ridges, in 1818–1533 m. The larger specimens from the Gorda Ridge measured 19–22 mm in length, 9–12 mm in width, with 21 segments. One specimen from the *Sea Cliff* dive had a long coiled parasitic copepod in the body cavity and extending to the outside.

Acknowledgments

I wish to thank Verena Tunnicliffe of the University of Victoria for the specimen from the Juan de Fuca Ridge, J. Frederick Grassle and Rosemarie Petrecca of the Woods Hole Oceanographic Institution for the DSRV *Alvin* specimens, and Michael A. Boudrias of the Scripps Institution of Oceanography for the DSRV *Sea Cliff* specimens from the

Gorda Ridge. The manuscript benefited from the reviews of Thomas H. Perkins and James A. Blake.

Literature Cited

- Detinova, N. N. 1988. New species of polychaetous annelids from hydrothermal vents of the Juan de Fuca Ridge (Pacific Ocean).—*Zoologicheskoy Zhurnal* 67(6):858–864. (In Russian, English summary.)
- Hanley, J. R. 1989. Revision of the scaleworm genera *Arctonoe* Chamberlin and *Gastrolepidia* Schmarda (Polychaeta: Polynoidae) with the erection of a new subfamily Arctonoinae. — *The Beagle, Records of the Northern Territory Museum of Arts and Sciences* 6:1–34.
- Pettibone, M. H. 1985a. Polychaete worms from a cave in the Bahamas and from experimental wood panels in deep water of the North Atlantic (Polynoidae: Macellicephalinae, Harmothoinae).—*Proceedings of the Biological Society of Washington* 98:127–149.
- . 1985b. Additional branchiate scale-worms (Polychaeta: Polynoidae) from Galapagos hydrothermal vent and rift-area off Western Mexico at 21°N.—*Proceedings of the Biological Society of Washington* 98:447–469.
- . 1985c. New genera and species of deep-sea Macellicephalinae and Harmothoinae (Polychaeta: Polynoidae) from the hydrothermal rift areas off the Galapagos and Western Mexico at 21°N and from the Catalina Channel.—*Proceedings of the Biological Society of Washington* 98:740–756.
- . 1988. New species and new records of scaled polychaetes (Polychaeta: Polynoidae) from hydrothermal vents of the Northeast Pacific Explorer and Juan de Fuca Ridges.—*Proceedings of the Biological Society of Washington* 101:192–208.
- . 1989a. New species of scale-worms (Polychaeta: Polynoidae) from the hydrothermal rift-area of the Mariana Back-arc Basin in the western central Pacific.—*Proceedings of the Biological Society of Washington* 102:137–153.
- . 1989b. Polynoidae and Sigalionidae (Polychaeta) from the Guaymas Basin, with descriptions of two new species, and additional records from hydrothermal vents of the Galapagos rift, 21°N, and seep-sites in the Gulf of Mexico (Florida and Louisiana).—*Proceedings of the Biological Society of Washington* 102:154–168.

Department of Invertebrate Zoology, National Museum of Natural History, Washington, D.C. 20560